

# Sara Keller

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## EDUCATION

- University of Washington**, Seattle, WA Sept 2016-  
Exp. 2021  
Bioengineering Department, Ph.D Student  
3.85 / 4.00
- Vanderbilt University**, Nashville, TN Aug 2012-  
May 2016  
*Bachelor of Engineering*, Biomedical Engineering  
*Minor*, Chinese Language and Culture  
Magna Cum Laude, 3.84 / 4.00

## EXPERIENCE

- Graduate Research Assistant**, University of Washington, Seattle, WA Sept 2016-  
Present  
Laboratory of Mike Averkiou  
Bioengineering Department
- Optimizing ultrasound parameters and microbubbles for enhanced drug delivery *in vivo* and *ex vivo* using single element transducers and linear arrays
  - Implementing passive cavitation detection schemes on a diagnostic ultrasound device
  - Mentoring younger students on ultrasound basics and research practices
- Laboratory Intern**, Vanderbilt University Medical Center, Nashville, TN June 2016-  
Aug 2016  
Laboratory of William Fissell  
Department of Nephrology
- Developed computational fluid dynamics (CFD) models of artificial kidney devices to test for areas of low wall shear stress that may lead to coagulation *in vivo*. Utilized transient physiological pressure profiles for boundary conditions
  - Discovered that blood velocities taken from CFD simulations agreed with blood velocities measured using Doppler ultrasound from canines implanted with the devices *in vivo*
- Undergraduate Research Assistant**, Vanderbilt University, Nashville, TN Jan 2015-  
May 2016  
Mentored by Amanda Buck  
Vanderbilt University Institute for Imaging Science
- Reconstructed patient-specific geometries of cerebral arteries using automatic segmentation of MRI-Time of Flight images and discretized using finite element modelling
  - Ran computational simulations at both patient-specific steady-state and transient blood flow, taken from phase contrast MR images
  - Found results indicating that high vessel wall shear stress correlated with increased stroke risk
- College Technical Intern**, Northrop Grumman Aerospace Systems, Redondo Beach, CA June 2013-  
Aug 2013  
Ground Systems Electronics
- Tested incoming circuit boards for functionality using electrical test equipment (oscilloscope, spectrum analyzer, pattern generator)
  - Designed, ordered parts, and facilitated assembly for an electrical test aid

## TECHNICAL SKILLS

*Proficient*: MATLAB, C++ (including data structures), Java, ANSYS icem-cfd/Fluent  
*Some Exposure*: LabView, C

## LABORATORY SKILLS

Cell culture, fluorescence microscopy, ultrasound scanning (Philips EPIQ, iU22 and GE LOGIQ), ultrasound instrumentation, image processing, digital signal processing, microbubble fabrication, mouse handling, animal experimentation, cryosectioning, ImageJ

## RESEARCH INTERESTS

Image guided therapy and drug delivery, passive cavitation detection, contrast enhanced ultrasound, digital signal processing, novel contrast agent development, microbubble physics, acoustics

## PUBLICATIONS

**Keller, S.**, Suo, D., Wang, Y-N, Kenerson, H., Yeung, R.S., Averkiou, M. “Vascular disruption and enhanced drug penetration performed in a mouse model of hepatocellular carcinoma with a clinical scanner.” [*in prep*]

**Keller, S.**, Averkiou, M. “Cavitation therapy monitoring of commercial microbubbles with a clinical scanner.” [*in prep*]

**Keller, S.**, Bruce, M., Averkiou, M. “Ultrasound Imaging of Microbubble Activity During Sonoporation Pulse Sequences.” *Ultrasound Med. Biol.* 2019 Mar;45(3):833-45

Juang, E., De Cock, I., Keravnou, C., Gallagher, M., **Keller, S.**, Zheng, Y., Averkiou, M. “Engineered 3D microvascular networks for the study of sonoporation and ultrasound-microbubble-mediated drug delivery.” *Langmuir* 2018

Buck, A.K.W., Groszek, J., Colvin, D., **Keller, S.**, Kensinger, C., Forbes, R., Karp, S., Williams, P., Roy, S., Fissell, W. “Combined *in silico* and *in vitro* approach predicts low wall shear stress regions in a hemofilter that correlate with thrombus formation *in vivo*”. *ASAIO*. 2018 Mar;64(2):211-17

## PRESENTATIONS

**Keller, S.**, Suo, D., Wang, Y-N, Kenerson, H., Yeung, R.S., Averkiou, M. “Vascular disruption and enhanced drug penetration performed in a mouse model of hepatocellular carcinoma with a clinical scanner.” 25<sup>th</sup> European Symposium on Ultrasound Contrast Imaging (poster presentation)

**Keller, S.**, Averkiou, M. “Cavitation therapy monitoring of commercial microbubbles with a clinical scanner.” 25<sup>th</sup> European Symposium on Ultrasound Contrast Imaging (poster presentation, *best poster award*)

**Keller, S.**, Sheeran, P., Averkiou, M. “Real-time cavitation therapy monitoring with a clinical scanner” 24<sup>th</sup> European Symposium on Ultrasound Contrast Imaging (poster presentation)

**Keller, S.**, Bruce, M., Averkiou, M. “High Resolution Ultrafast Imaging of Microbubble Destruction During Sonoporation” 23<sup>rd</sup> European Symposium on Ultrasound Contrast Imaging (poster presentation, *best poster award*)

**Keller, S.**, Zong, R., Hannah, A., Bruce, M., Averkiou, M. “High Resolution Ultrafast Imaging of Microbubble Destruction During Sonoporation” IEEE International Ultrasonics Symposium 2017 (poster presentation)

Buck, A.K.W., Groszek, J., Colvin, D., Kensinger, C., **Keller, S.**, Forbes, R., Karp, S., Williams, P., Roy, S., Fissell, W. “Combined *in silico*, *in vitro*, and *in vivo* approach predicts low WSS regions that correlate with thrombus formation *in vivo*” SB3C 2017 (invited oral presentation)

**Keller, S.**, Merkle, K., Dampier, C., DeBaun, M., Gatenby, J.C., Kassim, A., Yang, E., Gore, J., Buck, A.K.W., “Exploring Cerebral Hemodynamics in Patients with Sickle Cell Anemia” Vanderbilt University Undergraduate Research Fair 2015 (poster presentation)

## LEADERSHIP

**Graduate Student Lead**, *Bioengineers without Borders*

Sept 2017-present

- Leading a team of graduate and undergraduate students to develop a low-cost shear wave elastography device for measuring skin dehydration, with applications in domestic and global health markets
- Successfully won a \$25k grant through Amazon Catalyst
- Designed, organized and facilitated task delegation, subgroups and timelines for project achievement

- Grader, Therapeutic and Diagnostic Ultrasound (BIOEN 549/449)** March 2019-June 2019
- Responsible for grading homework, exams, and final projects
  - Held office hours to help students with homework, conducted three lab experiments throughout the quarter on ultrasound acoustics, imaging principles, and HIFU, conducted exam preparation teaching sessions

- Grader, MRI & Ultrasound (BIOEN 547/447)** January 2018-March 2018
- Responsible for grading homework, exams, and final projects
  - Held office hours to help students with technical questions on homework assignments and preparing for exams

#### **AWARDS/HONORS**

- Institute for Translational Health Sciences TL1 Program Fellow March 2018-March 2019
- Amazon Catalyst Funding Grant, Bioengineers without Borders March 2018-March 2019
- Best Poster, 23<sup>rd</sup> European Symposium on Ultrasound Contrast Imaging January 2018
- National Science Foundation Graduate Research Fellowship Honorable Mention March 2017
- Tau Beta Pi, inducted member Dec. 2015
- Vanderbilt University Undergraduate Honors Scholarship June 2013-May 2016
- Vanderbilt University School of Engineering Dean's List Dec. 2012-May 2016

#### **OUTREACH**

- Bioengineers without Borders, *graduate student lead* Sept 2017-present
- Vanderbilt Students Volunteer for Science, *team leader* Sept 2013-May 2016
- V<sup>2</sup> Mentorship Program Sept 2013-May 2016
- Vanderbilt Alternative Spring Break: Homelessness Issues, San Francisco, CA March 2015